

DENVER PC BOARDWATCH

NEWSLETTER FOR DENVER AREA ELECTRONIC BULLETIN BOARD SYSTEMS

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Issue 2

April 1987

BITS

POPULATION WATCH: How many of us are there? The US Census Bureau not only knows, but now they're telling...via modem. The Population Estimate Bulletin Board System (BBS) at (301)763-5225 provides up-to-date population estimates. Although the service is free, you must register to get a password by calling (301)763-7722.

PC PURSUIT: Have you been getting local static at home over long distance charges incurred while connected to out-of-town BBS? We may have an answer. PC PURSUIT allows users to access any BBS in 25 cities for a flat \$25 signup fee and \$25 monthly. Unlimited evening (6pm-7am) and weekend use from any area having local telenet access (over 17,000 exchanges), along with convenient credit card billing, make this service appear to be a sure winner. It appears to be growing as well. February access to 14 cities grew to 25 in March with 50 cities expected by year end. Significantly, PC PURSUIT maintains its own info/signup BBS on a free WATS line at (800)835-3001.

YELLOW PAGES: American Business Lists Inc. has devised a means to let your fingers do the walking via modem. The INSTANT YELLOW PAGE SERVICE provides on-line access to every Yellow Page directory published in the country. The database contains an impressive 13 million business listings. Apparently the company

is quite proud of it. They ask a signup fee of \$95, connect time of \$1/minute, \$0.10 per record retrieved, and a \$60 annual renewal fee. Despite the cost, this could prove an invaluable research service to many businesses. INSTANT YELLOW PAGE SERVICE, P.O. Box 27347, Omaha, NE 68127 (402)331-7169 (voice).

JOB HUNTING VIA MODEM: A number of career search firms have recently added Job Search BBS to their repertoire of techniques for contacting programmers, engineers, technical writers, and other technical professionals. Business People Inc. sponsors tech fairs in a number of cities. Now they also sponsor Adline (612)941-3957 (password "BPI") where you can check for job openings with companies like Emerson Electric, Rohr, BankAmerica and GTE as well as upload your resume for their consideration. EDP Professionals of Charlotte NC sponsors a similar JOBLIST service at (704)554-1102. This BBS lists the ACCRA Cost of Living Index for Metropolitan Cities as well. Companies who maintain their own job boards include:

<u>Company</u>	<u>Number</u>	<u>Password</u>
Northrop	(213)938-5532	none
LTV	(612)941-5723	JOBLINK
Sperry	(617)275-4112	SPERRY

Note that Northrop uses 7 data bits, 2 stop bits, and no parity. The other boards all use standard 8 data bits, 1 stop bit, no parity parameters.

LOCAL SERVICE

TURBO CONNECTION is now titled MILE HIGH TURBO BOARD. Still available at 423-3114 but running under new software under development by sysop Adam Hudson.

TBBS PARLOR (455-3283) has made a name change to METROPLEX FIDO 104/69.

CHRISTIAN PROTOCOL has moved from its old number at 426-4052 to new quarters at 745-1504 effective February 28, 1987.

Another Christian BBS, THE RETREAT has moved from 369-7052 to a new residence at 733-1609.

We welcome a new board up as of January in GRIZZLY KING. Bob McDuffee is sysop operating at 666-0824. This is an IBM system. Theme seems to be outdoorsman messages/info but a cursory review reveals a wealth of current software. At one point, Mr McDuffee professed he had hard disk space problems from the large quantity of uploads. GRIZZLY KING also sports a copy of a BBS newsletter titled INFO-MAT. An awkward multiple file format but filled with interesting tidbits of computerabilia. This board also sports a very informative FREEWARE SIG message area.

Another new board on-line in February is CABLE NET OPUS at 595-0003. Ted Gilmore serves as sysop. It seems to be an IBM board running OPUS software.

John Maxwell is running the new CONTROL POINT FIDO 104/711 for sponsor QUEST ELECTRONICS at 526-9642. The board has little message traffic at this point but some interesting technical data.

Rumor has it there is a trojan version of PC-WRITE 2.71 floating around. Apparently, the program reformats your hard disk when run....We would have settled for a good thesaurus.

KUDOS to Chris Day's DAY'S END board at 650-5636. Chris is running a sharp looking version of OPUS software. He has a large selection of download software, but most noticeable is the time and effort invested in making the screens/instructions some of the clearest and most readable in the area. Mr. Day has a talent for writing clearly and imaginatively. Equally refreshing is the obvious work invested in cataloging all files with clear, complete file descriptions.

David Shenemans' DENVER DEAF-NET (989-9245) has served the hearing impaired/computing community for several years. David announced in February that he was forfeiting his Apple to the kids, buying an IBM compatible and shutting down the board effective March 1, 1987. Apparently his users wouldn't hear of it. Back up by popular demand - DENVER DEAF-NET.

ELECTRONIC LOCKSMITH RCP/M and LOCKSMITH'S ANNEX are both operating out of the same number temporarily (698-1623). These boards are among the last of the active CP/M boards. They feature a wealth of CP/M software for download as well as some unusual MS-DOS titles and a very active message section handling technical questions on CP/M and computers in general. The Boulder User's Group (BUG) found meeting "live" to be a bit of a struggle. Sysops Steve Eckwall and Laura Conlon have provided them an electronic meeting place on the ELECTRONIC LOCKSMITH.

C.A.R.L. UPDATE: Last issue we detailed the Colorado Alliance of Research Libraries (C.A.R.L) as a research service. We've found another C.A.R.L number providing a similar service for the Boulder, Broomfield, and Louisville Public Libraries. The service is available at 444-2057 and we found out a little about the system it runs on.

The database is hosted on a 4-processor TANDEM TNS-II system with 8 Megabytes of main memory, 2 64Meg hard drives, 2 300Meg hard drives, and 4 240Meg removable disc drives. In addition it sports 80 asynchronous terminal ports.

The databases consist of a Public Access Catalog (PAC), a Circulation Control System (CIRC) and the Bibliographic Maintenance System (MAINT). These systems operate on a database consisting of 143,408 titles for the Boulder library, 42,093 titles for the Mamie Doud Eisenhower Public library (Broomfield), and 18,773 titles for the Louisville library. In effect, this allows users to perform searches by author, title, subject, or text string on a database of 204,274 titles.

Our Colorado Springs readers can access the Penrose Library C.A.R.L at 632-2194.

LONG DISTANCE

ASTRONOMERS: Curious about the current supernova of a nearby star? The CELESTIAL RCP/M BBS in Austin Texas may have some answers. Sysop T.S. Kelso is a frequent contributor to Sky and Telescope Magazine. 3/12 baud, 24 hrs, (512)892-4180.

CENSUS BUREAU JOBS: The Census Bureau maintains a Personnel Division BBS listing job vacancies withing the bureau from

entry level to senior management. Open to the public at (301)763-4574.

ECONOMIC INFO: Need the latest consumer price index, labor statistics, interest rates, single family housing starts, manufacturers shipments, inventories, and orders, or other economic indicator data? You can get it right from the horses mouth - much of it in Lotus 123 format. The U.S. Department of Commerce maintains an ECONOMIC BULLETIN BOARD at (202)377-3870 and (202)377-0433. This is a fee board but you can sign up on-line.

PC MAGAZINE: PC Magazine has a free interactive reader service BBS at (212)696-0360. This BBS contains indexes of the 85 and 86 issues, a large number of very useful PC utilities (with source code), and a national BBS list. PC Magazine recently clarified their policy concerning their published utility programs to allow free distribution via non-commercial electronic bulletin boards.

OTHER NATIONAL LISTS: DARWIN SYSTEMS BBS (301)251-9206 maintains a national BBS list that is updated weekly, published the first of each month, and restricted to IBM PC Boards only. The group gratefully accepts list updates. While maintenance of a national BBS list is difficult, this seems to be a fairly accurate list. Locally, Mile Hi Tech at 973-9338 serves as the area (104) coordinator for a nationwide FIDO network. This is a group of almost 1500 BBS all operating within the operating provisos of a single network to pass electronic mail on a national basis. Mile Hi Tech maintains copies of the national

newsletter and a list of Fido Net BBS available for download This should be a very accurate national list. Watch for a detailed examination of FIDONET in future issues.

GOVERNMENT BBS: The Federal Government seems to be entering the BBS field as more than a hobby. The list below is just a sampling.

GOVERNMENT BBS LIST

TITLE	DESCRIPTION	NUMBER
Budget and Finance BBS	Financial matters	(202)786-3640
Census Bureau Manpower	Bureau job vacancies	(301)763-4574
Census Bureau CMIC	Micro news/info for staff	(301)763-4576
COE Manpower BBS	Army Corps of Engineers	(202)272-1514
East Coast Marine Weather BBS	National Weather Service	(301)454-8700
Exporter's BBS	Export*Import Bank	(202)566-4602
Fannie Mae BBS	Federal National Mortgage	(202)537-7475
Info Technology Center BBS	Veterans Administration	(202)376-2184
Institute Comp Sci and Tech	National Bureau of Stds	(301)948-5718
IRS User Assistance BBS	Internal Revenue Service	(202)756-6109
Megawatts BBS	Department of Energy	(202)252-1518
National Center Health Statist.	Health/disease control	(301)436-6346
Population Estimate BBS	Bureau of Census	(301)763-5225
Science Resource Studies BBS	National Science Foundation	(202)634-1764
Economics BBS	US Department of Commerce	(202)377-0433
World Bank	International Lending	(202)477-8500

UTILITIES

OLINK 32.ARC Wynn Wagner III. This utility program is titled OPUS Link version 3.2. It provides users of programs like ProComm 2.4.2 with an external module to allow transfers via the SEALink file transfer protocol. This protocol was developed by System Enhancement Associates, the same group that brought us ARC and its supposed to be extremely efficient.

Unarc'ing OLINKA32.ARC results in OLINK.DOC and OLINK.EXE files. Move the OLINK.EXE into the same directory as your ProComm files. From the normal ProComm screen, press ALT-F4 to access DOS and enter OLINK -b1200 to activate OPUS Link. The <PG UP> key uploads and <PG DN> to download just as you would from ProComm. Alt-X exits OLINK and EXIT will

return you to ProComm's main screen as usual.

With this little program you can easily perform SEALink file transfers from ProComm or other communications software. Available for download from The 8th Sea (252 9235).

ARC520.COM: System Enhancement Associates released version 5.20 of its ARC archive file utility January 8, 1987. ARC is the standard utility for compressing files for storage or teletransfer. In this version, the squeeze algorithm (Huffman encoding) was dropped. Adding a file to an archive should be 14% faster. Low level file copying was added as well as the ability to pass command line arguments when using the RUN command.

Last issue we reported on a series of "clones" titled ARCA,

ARCE, and ARCV. These programs were smaller and faster than ARC but each program performed only one function. Well, if you can't beat em, join em. SEA has included the ARCE program on the ARC520.COM program disk. ARCE, ARCA, and ARCV were written by Vernon D. Buerg and Wayne Chin. They can be reached at RBBS (415)994-2944. To check for the latest version of ARC, try System Enhancement Associates' SEABOARD BBS at (201)694-3348 or write System Enhancement Associates Inc. 21 New Street, Wayne NJ 07470.

XDIR.COM: Jeff Prosis. This little program is one of the most useful and well behaved little utilities we've found. Its a Terminate-and-Stay-Resident (TSR) program like Borland's Sidekick and we think its indispensable enough to deserves a call from your AUTOEXEC.BAT file every time you power up.

Thereafter, you can activate the program by pressing the ALT and period keys simultaneously to call up a blank window - no prompts of any kind. Type in a DOS pathname, and the window fills with the directory of files from the specified path. You can call up a directory from any application program and browse through it using the PG UP and PG DN keys. Send it "away" by pressing the ESC key twice.

After twenty minutes with this program, we can't remember how we did without it. The ability to easily and quickly check a couple of file directories without exiting your current application or even moving the cursor is something you don't even know you need till you have it. The program is more fully described in the April 14, 1987 issue of PC Magazine. Its available for download directly from their interactive reader service BBS at

(212)696-0360. This BBS contains a large number of DOS utility programs available for download. We think XDIR.COM is the best of the bunch.

PROTOCOL TUTORIAL

XMODEM CRC: Last issue we described the XMODEM file transfer protocol. At one time, this was the most popular method for transferring files between personal computers via telephone. In recent years, XMODEM CRC has largely replaced it as the protocol of choice. The reason for this shift has to do with error checking.

Recall that XMODEM used a single 8-bit checksum byte at the end of each data block to check the integrity of the transmitted data block. Occasionally, a line hit that wiped out two complimentary bits (double bit error) or more than nine consecutive bits (burst error) could sneak past the error checking algorithm allowing file corruption.

In the mainframe world, the International Telegraph and Telephone Consultative Committee (CCITT) communications standard used a 16-bit Cyclic Redundancy Check (CRC) that more effectively caught errors. This method catches all single and double bit errors, all errors with an odd number of bits, all 16 bit and under burst errors, 99.997% of all 17 bit burst errors and 99.998% of all burst errors longer than 17 bits.

John Byrn added this 16 bit CRC checksum to the XMODEM protocol to create XMODEM CRC-16 usually referred to as just XMODEM CRC. Effectively, this made XMODEM CRC more "error proof" than XMODEM.

THE BASICS: Like XMODEM, XMODEM CRC transfers files between computers in 128-byte blocks.

The receive computer initiates the transfer by issuing a one byte signal to the sender. The sender then transmits the data blocks one at a time. The receiver acknowledges receipt after each block and asks the sender to retransmit any block received with errors. Ten "bad" blocks in a row will cause an abort of the procedure. As in XMODEM, communications parameters are asynchronous half-duplex, 8 data bits, 1 stop bit, no parity.

There are two main differences between XMODEM CRC and XMODEM:

1. Receiver initiates transmission using the ASCII character C rather than the Negative ACKnowledge (NAK) used by XMODEM.

2. The transmitted block terminates with a two-byte CRC value rather than the single-byte checksum used by XMODEM.

BLOCK MAKEUP: Although the data block is defined as 128 bytes in length, the actual transmission is 133 bytes consisting of:

BYTE 1	SOH
BYTE 2	Block number
BYTE 3	255-byte 2
BYTE 4-131	128 data bytes
BYTE 132-133	CRC value

BYTE 1 contains the Start of Header (SOH) character (dec 1/hex 1). BYTE 2 contains the block number beginning with 1 and incrementing with each block up to 255 then rolling over to 0 and starting again. BYTE 3 contains the ones-complement of BYTE 2 (255 minus value in BYTE 2). This is an error check of the block number in BYTE 2 which is quite important. BYTES 4-131 contain the 128 data bytes from

the file. If the file ends in the middle of this block, the block is padded out with throwaway characters. BYTES 132-133 contain the CRC value used for error checking.

INITIATING TRANSMISSION XMODEM CRC is downward compatible with XMODEM. This means that both the sender and receiver can detect if the CRC option is supported by the other end and fall back to a normal XMODEM transfer if not. This requires a bit of "handshaking" in the beginning to select protocol.

As always, the receiver initiates transmission - in this case by transmitting the "C" character (dec 67/hex 43) every three seconds. If the sender supports CRC, it will recognize the C as the signal to begin transmitting. If it doesn't, it will ignore the C and continue waiting for the NAK (dec 21/hex 15) normally used to initiate transfer in XMODEM.

After transmitting the C character a few times with no response the receiver assumes the sender does not support CRC. As a result, it reverts to normal XMODEM and begins transmitting NAK characters. The sending computer can then begin transmitting in XMODEM. In this way, both sender and receiver start out in CRC mode. If the initial C character handshake fails from either end, they both fall back to normal XMODEM operation.

Assuming a successful handshake, the sender will transmit the first block. The receiver detects the SOH and checks the next two-bytes for the correct block number. The number must be either the last block transmitted, or the next block in series. The next 128 bytes of data are stored temporarily and the CRC

calculation performed on them. The results of this calculation are compared to the two-byte CRC value at the end of the block.

If the block number is correct and the CRC calculation matches the senders CRC, the receiver adds the 128 data bytes to the file and issues an ACKnowledge (ACK) byte (dec 6/hex 6) to the sender. If the block number or CRC calculations do not match, the receiver discards the 128 bytes and issues a NAK to the sender.

When the sender receives the ACK signal, it increments the block number, retrieves the next 128 data bytes, and calculates a new CRC to add to the end of the block before transmitting. If the sender receives a NAK reply from the receiver instead, or if no reply at all is received after ten seconds (ACK or NAK wiped out by line noise), the sender retransmits the last file sent in its entirety complete with SOH, block number, data, and CRC. Ten attempts at the same block without an ACK reply causes the sender to abort the file transfer.

Once the last block has been sent out, the sender issues an End Of Text (EOT) character (dec 4/hex 4) to signal the end of

file transfer process. It will continue to send EOTs until the receiver responds with ACK. Figure 1 depicts a 3 block XMODEM CRC file transfer with data loss during transmission of block 2.

CRC CALCULATION: Of course, the heart of the XMODEM CRC protocol is the CRC calculation algorithm. The 128 byte data block is treated as a continuous message stream of 1024 bits. Each bit is considered to be the coefficient of a 1023rd order polynomial. The first bit received is X^{1023} , the second is X^{1022} , the third is X^{1021} and so on to X^0 .

This message polynomial is first multiplied by X^{16} . The result is divided by a "generator" polynomial. This could be anything, but by convention we use the term $X^{16}+X^{12}+X^5+1$. Both the multiplication and division are performed using modulo 2 arithmetic. This means there are no carries or borrows from one bit to the next. The result of the division is discarded. The two-byte remainder is used as the CRC value.

Figure 1. Sample 3 Block Transfer - XMODEM CRC

<u>SENDER</u>	<u>RECEIVER</u>
	C (3 seconds) C
SOH [1][254][128 data][CRC][CRC]	
SOH [2][253][128 data][CRC][CRC]	ACK
SOH [2][253][128 data][CRC][CRC]	NAK (noise)
SOH [3][252][128 data][CRC][CRC]	ACK
EOT	ACK

COMMUNICATIONS SOFTWARE

To effectively use the wealth of Denver area on-line services and BBS requires a capable communication software program. The amateur BBS movement itself has produced a number of excellent packages we feel not only rival commercial packages, but as a rule, better them.

Most of these programs are distributed under a "shareware" principle. The authors allow you to use the program for review and make unlimited copies to pass along to your friends. If you decide the program warrants continued use, they ask you send a modest "registration fee" of \$25 to \$50. This usually results in some documentation, notices of new program releases, and access to on-line support via a "home" BBS maintained by the authors.

Four communications programs have emerged as the software of choice among chronic BBS users. All four use this inexpensive "shareware" principle. In this issue we introduce these four titles. In future issues, we will review each of these programs in greater detail.

PROCOMM 2.4.2. This is probably the most popular of the communications programs. It has been warmly received largely due to a very easy to learn user interface and rich selection of features usually referred to as "bells and whistles."

The program comes in one ARC file and the documentation in another. Like all the programs described here, it contains a dialing directory capable of storing BBS by title and telephone number. ProComm's directory holds 99 numbers with the associated communications parameters. Only one directory can be used without some fairly

gymnastic file manipulation. Although some reports of file transfer difficulties have been circulating, the bugs seem largely esoteric, and the program is generally recognized as the "best seller" among shareware communications programs.

QModem 2.4: This is a new beta test release of the oldest of the four programs we mention here. The 2.4 edition features a 200 entry dialing directory, a number of very well behaved file transfer protocols and a fairly fast operating touch. Notably, version 2.4 provides a real-time analysis of file transfer efficiency displaying both actual characters-per second transfer rate and a percentage value of a theoretical "best" rate in all transfer modes. This program consistently renders the most reliable file transfers and the transfer window has a pleasing and informative design.

Our main negative comment is that during the dial process, and especially during the circular dial que function, it does not display the BBS title dialing - a minor and easily repaired fault.

TELIX 2.12: This program is a relative newcomer hailing from Ontario Canada. It avoids a number of the bells and whistles in favor of blinding speed and a wealth of file transfer protocols. Telix supports more protocols than the other programs and includes SEALink, a protocol developed by System Enhancement Associates (of ARC fame) and quickly gaining wide acceptance.

An very pleasing info display is shown with the help window listing the date, time, protocol, communications parameters, etc. Telix provides a 150 entry dial directory and supports easily switched multiple directories. Most importantly, Telix is fast.

If you need to look at the keyboard to type, you'll miss most of what happens with Telix. By the time you look up - it will all be over.

GT POWERCOMM 12.10: We saved the most perplexing for last. This program is the top contender to dethrone ProComm 2.4.2 as most popular communications program. GT PowerComm provides the most exhaustive dialing directory in the business at 999 entries and supports multiple directories. Additionally, this dialer logs the last date and time each entry was connected, and provides columns for passwords, hours of operation, etc. The dialer is "point and shoot" with this version and clearly has no equal among communications program dialing directories.

Another item that distinguishes this package from the others is a truly magnificent host mode. Host mode allows the user to dial in to his computer from a remote location and perform operations as if he were there. While all of these packages provide some form of host mode, GT's is actually a full blown BBS itself, providing multiple message boards, bulletins, multi-level password

logon, files list, upload and download, and DOS shell. You could quite easily run a BBS using this feature. In fact, the support BBS is actually version 12.10 in host mode.

The bad news is that the program is slow to the touch, has endured numerous serious bugs, and has the poorest file transfer facilities available. The file transfers are slow and the transfer window is not very informative. GT Powercomm could be our top pick with a little better file transfer and a few less operating bugs.

SUMMARY: The ideal communications program has yet to be written. If you are considering writing it, we would urge you to take ProComms features and user interface, speed it up to Telix speed, use the QModem file transfer facility, and add the dialing directory and host mode of GT Powercomm. All four of these programs are available in some version for download from local BBS. To be sure of obtaining the latest release, contact the authors respectively at the address or on-line telephone listed below.

COMMUNICATIONS SOFTWARE

TITLE/VERSION	RELEASED	AUTHOR	ADDRESS	SUPPORT PHONE
GTPowercomm 12.10	3-20-87	P&M Software /Paul Meines	9350 Country Creek Houston, TX 77036	(713)772-2090
ProComm 2.4.2	10-17-86	Datastorm Technologies	P.O. Box 1471 Columbia, MO 65205	(314)449-9401
QModem 2.4	12-14-86	Forbin Project/ John Friel	4945 Colfax Ave. S. Minneapolis, MN 55409	(612)824-8167
Telix 2.12	2-24-87	PTel/Colin Sampaleanu	276 Guildwood Parkway Toronto, Ontario M1E-1P9	(416)662-8254

HARD DISK UPGRADE

Initially, a 20 Mbyte hard disk drive seems like "unlimited" storage. But sooner or later you're forced to learn a game called "disk shuffle." The rules are simple: to save a file the size of your name or larger to the hard disk, you must first make room for it by offloading something to floppy.

Of course, you could buy a larger hard disk - if money is no object. But, we may have found an "on the cheap" solution - if you can afford a bit of data risk.

Adaptec Inc. makes a hard disk controller card, the ACB-2070A, using Run-Length-Limited (RLL) encoding to squeeze 30 Mbytes formatted capacity out of a 20 Mbyte hard drive. As a bonus, data transfer rates quicken from the normal 5 MHz to 7.5 MHz.

The standard Seagate 20 Megabyte drive with Western Digital controller card encodes data using a Modified Frequency Modulation (MFM) method. Each track on the disk is comprised of seventeen 512-byte sectors. The drive actually consists of two oxide media platters with a single track recorded on each side of each platter to form a 4 track element termed a cylinder. Each cylinder contains 34,816 bytes (4 tracks X 17 sectors X 512 bytes). By convention, the drive is configured for 611 cylinders for a formatted capacity of 21,272,576 bytes (611 cylinders X 34,816). A Megabyte is defined as 1024 bytes rendering 20.774 Mbytes. This is variously listed as either 21 or 20 Mbytes.

The Adaptec card uses RLL encoding to allow higher data recording densities. This method uses an ambiguity reduction algorithm requiring twice as many bits to record the same data. But, the ambiguity reduction

allows a tripled recording density for a total storage gain of 1.5. As a result, the Adaptec can format 25 sectors per track vice the MFM standard of 17. This works out to 31,283,200 bytes (4 tracks X 25 sectors X 512 bytes X 611 cylinders) or 30.55 Mbytes formatted capacity.

Additionally, the disk spins at 3600 rpm regardless of controller card used. Because of the higher data density, data transfer is quicker as well - 7.5 MHz vice 5.0 MHz.

The Adaptec card is designed for use with high-quality plated media drives such as the Seagate ST-238. And Seagate specifically warns that the ST-225 oxide coated drives are not for use with the Adaptec controller. (Seagate (305)278-5522) That said, note that the adventurous within the hobbyist community are replacing their Western Digital cards with abandon, and apparently, at least some success.

Bill Doom, of Golden Micro, states that while the Adaptec does seem to work with the ST-225, it is analagous to formatting a normal double density 360 Kbyte diskette for the quad density required by the 1.2 Mbyte IBM AT floppy drive. If you're not too picky about your data - it will probably work.

The Adaptec card can control two hard disk drives. The cost? Adaptec lists the card at \$154. Locally, Golden Micro sells it for \$140 installed - in our opinion a bargain. For business users who do not care to experiment, they also sell a combination card and 20 Mbyte plated media drive package guaranteed to format 30 Mbytes for \$500. Golden Micro, 17301 West Colfax, Golden, CO 80401 278-0200. Adaptec Inc., 580 Cottonwood Dr., Milpitas, CA 95035 (408)946-8600.

EDITOR'S NOTES

This issue, we compiled several special interest BBS lists appearing throughout the newsletter. The Job Boards list on page 1, the Communication Software list on page 10, and the Government BBS list on page 4 are examples of specialized mini-lists you will see a lot more of in future issues. But the primary focus of Denver PC Boardwatch remains the list of local area Bulletin Board Systems (BBS).

Last issue we listed 161 BBS/on-line services available on the front range. This issue we present an updated, verified list of 193 services. Each of these services were actually contacted during March, 1987.

While this appears to be a gain of 32 BBS, in truth we "lost" several boards listed as UP in the last issue - and found almost 50 new ones. The dynamic nature of this electronic community explains why so many download lists appear outdated.

With this issue, we also present a new service. We've successfully ported our database of Denver area BBS to the file formats required by such Communication populars as ProComm, Telix, QModem, and GT PowerComm. We can now deliver these preloaded, alphabetized dialing directory files to your door on floppy disk. Simply copy the files into the file directory of your comm program. Subsequently, you'll find the entire Denver PC Boardwatch BBS list in your dialing directory.

Denver PC Boardwatch apparently struck a nerve. Response to our first issue was good. In fact, with this, our second issue, we go from what was planned as a bi-monthly

newsletter to a monthly edition. Those of you who subscribed at the six issue per year rate of \$12 will actually receive 12 issues - our gift to you for your early support. We submit our second issue for your consideration. We think its slightly better than the first, and not quite as good as the one we intend to present next month.

Support among sysops has been very good. The March issue was listed on several local BBS as menu items or Bulletin entries. This allowed users to view the newsletter without the necessity of performing a file download. Our special thanks to all the BBS that provided us this exposure. A couple of local BBS went further by opening Denver PC Boardwatch message areas on their boards, in effect, graciously providing us a BBS "home." As a result, you may leave feedback/info for Denver PC Boardwatch at Don Stone's Control Systems II BBS at 841-6065 or Adam Hudson's Mile High Turbo Board at 423 3114.

There was apparently some confusion as to our role in the BBS community due to our upload of an electronic version of the newsletter to several local BBS. We did this to allow users to view a sample copy of the newsletter without obligating for a subscription sight unseen. In fairness to our paid subscribers, we cannot, of course, distribute future issues electronically.

We will continue to bring you software reviews, feature interesting and innovative local and national BBS, and of course, provide the most extensive and accurate list of Denver area BBS possible. Thank you for your support in this effort.

DENVER PC BOARDWATCH LOCAL BBS LIST - CONFIRMED UP

BOARD	TELEPHONE	BAUD	HRS	DESCRIPTION	SYSTEM
Aces High	329-6579	3	24	Programming/general messages	Franklin
Advertising Connection	744-1595	3/12	24	Advertising/Commercial with SIG Sections	TRS
Alpha BBS/ Intercomex	367-1935	3/12/24	24	Tandy/Ham radio/Space topics	TRS
Annet	1-223-1297	3/12	24	Commodore/Amiga/C language	IBM
Apparat Inc.	798-7947	3/12/24	24	IBM Fido board	IBM
Apple Pi Board	422-3716	3/12	24	Apple user group messages/downloads	Apple
Atlantis	973-8369	3/12	24	Apple, MAC, Message	Apple
Aurora Net	688-9292	3/12/24	24	Protree Priase/Elite Support Board	Apple
Aurora Public Shools Network	693-6737	3/12	24	Stock market simulation/ APSNET	Apple
Aurthur's Den	688-1724	3	-8-	Commodore	Commodore
Avalon	699-6868	3/12	-8-	City on the edge of forever (fantasy)	-8-
Baha'i Board	449-3386	3/12	24	Religious/philosophy/Baha'i faith	IBM
Bank, The	771-7531	3/12	24	Not accepting new accounts	Apple
Barnacle Bills	428-8372	3/12	24	Apple II Messages	Apple II
Boulder Fido	497-6968	3/12/24	24	Messages and downloads	IBM
Boulder MAC Maniacs	666-7543	3/12	24	MAC Messages	Apple II
Box's Cabin, The	424-9185	3/12	24	Apple/Technical Notes	Apple
Buck Board, The	427-9539	3/12	24	Veterans messages, TRS-80, Amiga	TRS
Bud's BBS	761-6887	3/12	24	Atari - 3.123 Megs - News items	Atari
C.A.R.L Boulder/Broomfield	444-2857	3/12	24	Library Research	Tanden
C.A.R.L Colorado Springs	1-632-2194	3/12	24	Penrose Library	-8-
C.A.R.L Denver	838-1548	3/12	24	Colorado Alliance of Research Libraries	Mainframe
C.A.R.L Denver	838-1546	3/12	24	Colorado Alliance of Research Libraries	Mainframe
C.A.R.L Denver	838-1165	3	24	Colorado Alliance of Research Libraries	Mainframe
C.A.R.L Denver	838-1547	3/12	24	Colorado Alliance of Research Libraries	Mainframe
C.A.R.L Denver	838-8519	24	24	Colorado Alliance of Research Libraries	Mainframe
Cable Net Opus	595-8883	3/12	24	New Board!	IBM
Castle Dark Horn	741-5278	-8-	-8-	-8-	-8-
Chariot	1-632-3391	3/12	24	Unix/Conferences/NAPLPS graphics	-8-
Cherry Hills Village Post BBS	762-1981	-8-	-8-	-8-	-8-
Cheyenne Wells Shool District	1-767-5533	3/12	3p-Ba	High School BBS	-8-
Chip's Ahoy AE TAC	693-2452	3	24	Apple with ASCII express only	Apple
Christian Protocol	745-1584	3/12/24	24	Christian messages/bible text	Epson
Club House, The	756-9134	3/12	24	RP Games/golf format/messages	Apple
Coco County Airport	343-6707	3/12	24	TRS Color computer support	CoCo
Colorado Commodore Club BBS	452-8544	3/12	24	Commodore Info	C-64
Colorado Fire Net	1 591 7415	-8-	-8-	Colorado Springs	-8-
Colorado Sno-Bank	671-7669	3/12/24	24	Ski conditions,roads,winter rec info	IBM
Colorado University	447-2548	3/12	24	University mainframes (require access)	Mainframe
Down-Net Information Service	348-2473	3/12	24	* These four lines all access the same *	C-64
Down-net Information Service	366-3898	3/12	24	* service jokes/weather/sports/database *	C-64
Down-Net Information Service	366-7177	3/12	24	* C-64/C-128/Amiga Info-dnlds-messages *	C-64
Down-Net Information Service	366-2341	3/12	24	* excellent info for Commodore products*	C-64
Down-Post	534-4646	3/12	24	SIGS/Jokes/Messages	-8-
CompuMatch Club	467-3832	3	8a-5p	Adults only	-8-
Computer Fare	1-632-8669	3/12/24	24	IBM Hardware/Software sales	IBM
Computers Unlimited	762-9122	3/12	24	Sanyo MBC-551 Support	Sanyo
Computerworks	665-8789	3/12	24	Macintosh/IBM PC Info exchange	MAC
Control Point Fido 184/711	526-9642	3/12/24	24	New Fidonet	IBM
Control Systems II	841-6865	3/12/24	24	Free access version with 63M downloads	IBM
Control Systems Premier	458-6248	12/24	24	IBM/Compatibles subscription board	IBM
Controller Board/TBBS Island	698-9423	3/12	24	Computer supplies	TRS
COSUS	1-531-9674	-8-	-8-	Colorado Springs Fidonet	-8-
CP/M SIG INC IBM	465-1313	3/12	24	Oldest user's group in area CP/M - IBM	IBM
CPU Board	1-772-7229	3/12	24	Downloads and useful BBS info	TRS

DENVER PC BOARDWATCH LOCAL BBS LIST - CONFIRMED UP

BOARD	TELEPHONE	BAUD	HRS	DESCRIPTION	SYSTEM
Crossroads	989-8397	3/12	24	Discussion	TRS
CS BBS Service I	1-531-6668	3/12	24	Subscriber access Fido 128/11 Zenith	IBM
Data Bank	494-0167	3/12/24	24	IBM Messages - good utilities	IBM
Day's End	658-5636	3/12/24	24	Downloads, Messages, Astronomy	IBM
Dead Zone	1-468-8069	3/12/24	24	Let ring twice/call back in 20-45 second	IBM
Deathstar	286-8938	3/12	8p-6a	Fun posting	C-64
Dementia	989-8470	3/12	24	American MENSA Denver Chapter BBS	Apple
Den HUG	331-8982	3/12	24	Denver Heath/Zenith User Group	Heath
Denver Deaf Net	989 9245	3/12	24	Hearing impaired / computing	Apple
Denver Metroplex Fido 104/69	455-3283	3/12/24	24	Autocad/computer/sexual boards	Kaypro
Denver Tech Center BBS	799-4813	300-9600	24	Megafiles of downloads/on line chess	IBM
Denver Video Board	343-1579	3/12	20	Audio Visual production, jokes, downloads	C-128
Dialamatch 118/The Brokerage	796-9721	3	24	Adult matchmaking	Franklin
Dinosaur Board	1-652-3595	3/12	24	Specializing in outdated computers	TRS
Discovery, The	388-5437	3	24	Music/General	Apple
Dragon's Shadow	841-3721	3	24	Fantasy	-0-
Eagles Nest Fido 128/18	1-598-8413	3/12	24	Eagleview Middle School	IBM
Electric Land ST	449-3227	3	24	Atari Sales and Service	Atari ST
Electricland	447-2227	3	24	Atari Sales and Service	Atari
Electronic Locksmith RCP/M	698-1623	3/12/24	24	50M downloads (CP/M & MS-DOS)	CP/M
Enterprise	980-1304	3/12	24	20 boards/10 dwnld sections/games/trivia	Apple
Entertainment Line	969-9510	3/12	24	General entertainment	CoCo
ETA Denver	750-5042	3/12	24	ANSI, messages wx forecast downloads	Tandy
Eusebeia Fido	430-8376	3/12/24	24	Christian BBS - Full KJV Bible downloads	IBM
Excelcier	697-1244	3/12	24	Apple/Commodore message areas	Apple
Experience Software	798-0792	3	24	Franklin Messages	Franklin
Fantasy Mountain	278-8369	3/12	24	Art/Downloads	CP/M
Farm, The	449-1920	3/12	24	Apple II Messages	Apple
Fiddler's Fido 104/606	674-1859	3/12/24	24	IBM Equestrian	IBM
FIDO NBS	497-3934	3/12/24	24	Fido - good job search message board	IBM
Fishery, The	756-3813	3/12	24	Atari/Macintosh	Atari
F06-45	1-471-2415	3/12	24	Colorado Springs Osborne Group	Osborne
Galafrea	987-8161	3/12	24	C-64 downloads/messages	C-64
Genesis	423-8203	3/12	24-	Commodore	C-64
Genesis Project	287-8267	3/12	24	Apple II General	Apple
George Net Fido	322-4779	3/12	24	General message/download	IBM
Glider's Hangar	650-1389	3/12	3p-12a	Commodore - airport theme	C-128
GLOBAL Information	286-7914	3/12	24	Fee Subscription/Software database	-0-
Greenline	469-2853	3/12	10p-6a	Amiga	Amiga
Greeter Hub	1-473-3837	3/12	24	Discussions	IBM
Grizzly King	666-0824	3/12	24	Outdoor messages/IBM software/INFO-MAT	IBM
Grotto, The	694-9850	3/12/24	24	Amiga, Pascal	IBM
Hack Shack	688-8406	3/12	24	Commodore	C-64
Hard Rock Cafe	287-1508	3/12	3p-2a	RBBS information	IBM
HIP Shack	1-593-0766	3/12	24	Southern CO Fido 128/19 HAM/SWL	IBM
Hozerville	933-0906	3/12	24	Atari 8 BIT	Atari
JeffCo Schools BBS	973-2540	3/12	24	Apple II education	Apple
King's Market Bookshop	665-6091	3/12	24	Computers, books, writers area	TRS
Kings Bench	377-6725	3/12	24	Tandy 1000 only/\$2 reg fee/messages	TANDY1000
Laboratory, The	289-2549	-0-	-0-	Private BBS	-0-
Lakewood Department of Safety	987-7388	3/12	24	Police sponsored - law enforcement msgs	IBM
Lakewood RCPM/RBBS	985-1108	3/12	24	CP/M MS DOS Downloads	CP/M
Land of Lindon	987-2094	-0-	-0-	No info	-0-
Last Chance Fido 128/17	1-633-4711	3/12	24	IBM PC	IBM
LES-COM-NET	233-5824	3/12	24	Lesley College Communications Network	Apple

DENVER PC BOARDWATCH LOCAL BBS LIST - CONFIRMED UP

BOARD	TELEPHONE	BAUD	HRS	DESCRIPTION	SYSTEM
Locksmiths' Annex	698-1623	3/12/24	24	50M downloads (CP/M & MS-DOS)	CP/M
Magic	791-8732	3/12	24	Macintosh/Apple 6S	MAC
Mailbox BBS	658-6876	3	9p-6a	C-64/sports/HAM/Ads	C-64
Manville Information Services	978-3946	3/12	24	Business Software/Macintosh	IBM
mbkSYS!	443-9155	3	24-	Fido	IBM
Metro Computer Exchange	753-6677	3/12	24	IBM - C64 messages and downloads	IBM
Metro Data Exchange	838-2445	3	24	Commodore 64 - Grateful Dead Schedule	C-64
Micro-1848	289-2861	3	24	Private BBS for software support	TRS
Microlink B	972-4181	3/12	24	Fido board -good downloads	IBM
Mile Hi Foren	431-1484	3/12	24	Atari support	Atari
Mile Hi Tech Fidonet 184/56	973-9338	3/12/24	24	Fido area coordinator - Fido news	IBM
Mile High CUSSNet Fido 184/614	698-9924	3/12	24	CUSS Computer Use in Social Services	IBM
Mile High Epson User Group BBS	752-2943	3/12/24	24	MHEUG Club Board	EPSON
Mile High Net	671-7388	3/12/24	24	Fido board	IBM
Mile High Software Exchange	738-2258	3/12	24	Amiga/Apple downloads - messages	Apple
Mile High Turbo Board	423-3114	3/12	24	Turbo Pascal/Denver PC Boardwatch	IBM
Minds of Mines (MOM) BBS	273-3989	3/12/24	24	CSM Artificial Intelligence/Geotechnical	TI
Modem Net	688-8153	388-9688	24	38 boards/mail order entry	Apple
Musician's Den	321-6857	3/12	7p-9a	Music interests -24 hours on Sunday	Compaq
My Fido	795-1215	3/12	24	Messages/downloads for gays	IBM
Nycroft	777-8898	-8-	-8-	No info	-8-
Networks Unlimited	348-8368	3/12/24	24	Messages/downloads/polls	IBM
Networks Unlimited	296-3218	3/12/24	24	Messages/downloads/polls	IBM
Night Shift, The	322-1544	3/12	24	Casino, football	Apple II
Nuclear Conspiracy	986 1246	3/12/24	24-	Nuclear theme board	Apple
Nydsey III	691-8169	3/12	5p-8a	Adult/sex oriented - members only - 18yr	Apple
Old West	393-7519	3/12	24	BBS list, RP games,high score list,msg	C-128
One on One	423-7124	3/12	24	Dating/Personals	-8-
Overboard, The	695-8931	3	24	Overland High School	Apple
PACE	428-3696	3/12	24	Practical Apologetics/Christian Evangel.	-8-
PC Computer Brokers	452-9567	3/12	24	IBM,Epson Equity,TRS-80 Club Msgs	IBM
PC Jr. Net	789-4618	3/12/24	24	IBM PC Jr./ Space Exploration	IBM
Pencils	477-9548	3	24	Business/office supplies	Atari
Phone Connection	426-7969	3/12	nights	Commodore	C-64
Photo Tech BBS	781-1879	3/12	24	TRS 88/ HAM/Video/camera	TRS
Pinecliffe BBS	444-7873	3/12/24	24	125 Meg - Online Order for CDB Systems	IBM
PSINet	985-2634	3/12	24	Parapsychology/Near Death Exper./Bibliog	TRS
Ramnet	1 598 7667	-8-	-8-	Rampart High School	-8-
Reggae Land	698-8144	3	18p-6a	Commodore	C-64
Regimental Headquarters	375-9556	3/12	24	Commodore - military theme	C-128
Retreat, The	369-7852	3/12	24	Christian Gospel/Prayer	Apple
Revelstone	722-5886	3	5p-2a	No info	-8-
Rox Haven	789-3238	3/12	18p-6a	Atari/Commodore	Atari
Rocky Mountain 99ers	288-3692	-8-	-8-	RM99ers Club Board Texas Instruments 99	-8-
Rocky Mountain RBBS	758-2187	-8-	-8-	No info	-8-
Ron and Shannons AMIS	978-8296	3/12	24	Atari support 5.4 Megs	Atari
Running Board	252-4851	3/12	24	Transportation/Atari	Atari
Sanitarium	758-8563	-8-	-8-	Commodore	-8-
Sensaria II	762-8669	3	24	Apple II RP Games	Apple
Shannon Exchange	969-8585	-8-	-8-	Multiline system	Apple
Sheridan & Associates	935-1489	3/12	24	Buy/sell/trade - chess history	Apple
Skyline Computers	457-8328	3	24	Atari Messages	Atari
Solid Software Fido 128/15	1-591-4273	3/12/24	24-	Zenith 58 Meg	IBM
Sort Support	699-8222	-8-	-8-	No info	-8-
Space Network	494-8446	3/12	24	Planetary Society Mars Institute	IBM

DENVER PC BOARDWATCH LOCAL BBS LIST - CONFIRMED UP

BOARD	TELEPHONE	BAUD	HRS	DESCRIPTION	SYSTEM
Span Mania	423-8348	-8-	-8-	No info	-8-
Stampede	799-9733	3/12/24	6p-10a	Atari/Amiga messages/downloads	Atari
Stargate 15	755-6468	3	24	Commodore - Star Command Newsletter	C64
Stratagen	771-6647	3/12	24	Closed system.	IBM
Suffragette	421-1561	3	24	Commodore messages	C-64
TAC Headquarters	322-8337	3	24	Commodore	C-64
Taj Mahal	451-7222	3/12/24	24	28 Mbytes Apple	Apple
Telenet	337-6888	-8-	-8-	No info	-8-
Teletran 1	371-7645	3/12	24	Commodore online games	C-64
Temple of Doom	771-9523	-8-	-8-	No info	-8-
Temple of Mendal	494-7224	3/12	24	Commodore 64 downloads	C-64
The 8th Sea	252-9235	3/12/24	24	Scuba and rescue messages	IBM
This End Up Fido 184/30	438-1585	3/12	18p-10a	New Board - dBase -utils	IBM
TI Link	499-1822	3/12	24	TI 99/4A Fido 184/444	TI
Toadscape, The	741-5863	12	24	Atari ST messages/downloads	Atari
Top O' the Rockies BBS	1-963-3688	3/12/24	24	Ski Info/Solar/Music tapes/cds	TI
Trekker World	745-9538	3/12	7a-10p	Apple games/messages	Apple
Unknown TBBS	988-8155	3/12	24	BBS lists, Jokes, Amigas	CP/M
UPAS	665-8585	12	24	Unix Public Access System	-8-
UPAS	665-8586	3	24	Unix Public Access System	-8-
Vault, The	796-8539	-8-	-8-	USAF/ZMAG Member	Atari
Vern's Terminal Exchange	433-1158	3	24	Commodore messages/downloads/ads	C-64
Villa TI	1-574-2567	3/12	24	Front Range 99er Computer Club	TI
Vipertron/ PCP BBS	722-2633	3/12	24	Atari messages, surveys	Atari
Waterton Computer Club	977-7995	3/12/24	5p-7a/we	Martin Marietta Employees 38M dnlds	IBM
Werdna's Lair II	331-9276	3	24	Games	Apple
White Runes of Tinuviel	972-8566	3/12	24	Atari computers/Tolkien subjects	Atari ST
World Peace	328-4822	3/12/24	24	Current events, politics	Heath
ZAP!	367-4183	-8-	-8-	Atari/ST/8 bit	Atari

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QModem 2.3/2.4 Local BBS directory (1 200 entry file)	\$7.95	
Telx 2.10/2.12 Local BBS Directory (2 150 entry files)	\$7.95	
GT PowerComm 11/12 Local BBS Directory (1 200 entry file)	\$7.95	
GT PowerComm 11/12 National BBS Directory (875 entries)	\$7.95	

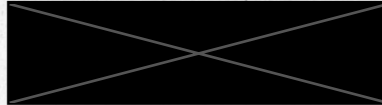
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HARDWARE: _____ SOFTWARE: _____